DRUG UTILIZATION STUDY IN THE OUTPATIENT PEDIATRIC DEPARTMENT OF A TERTIARY CARE TEACHING HOSPITAL OF DISTRICT LUCKNOW

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ABSTRACT

Objective: Irrational prescribing of drugs in pediatric age group is very common. In order to be rational, the drug therapy should be safe, efficacious, affordable & need based. Drug utilization studies are useful tool to facilitate rational prescribing of drugs. The present study was designed with the aim to assess prescribing trends in the pediatric department of a tertiary care teaching hospital.

Methods: The drug utilization pattern was carried out in the pediatric outpatient department of career institute of medical sciences, Lucknow. The study period was September 2014 to February 2015 (six months). A prospective study was carried out on the prescriptions, selected randomly with a total of 249 prescriptions. The data obtained were analyzed by MS-excel software. The results were expressed as percentage or proportion.

Results: Majority of the pediatric patients (40.12%) were suffering from acute respiratory infections (ARI) followed by diarrhea (18.66%). A total of 922 drugs were prescribed to the total of 249 patients. 63.11% of drugs were antibiotics, whereas the NSAIDS were15.65%. Average number of drugs per prescription was 3.7. Paracetamol was the most common drug prescribed followed by cefixime. Antibiotics were prescribed without investigation on empirical basis with an average of 2.11 per prescription. Cefixime was the leading antibiotic prescribed followed by cefpodoxim. Among the parenteral antibiotics, ceftriaxone followed by cefotaxim was prescribed in highest number of patients. Orally administered drugs contributed the highest proportion of drugs prescribed with 78.16% of total drugs. Parenteral drug preparations were 14.99%. Combinations of antibiotics were prescribed to 65.66% of patients of which ceftriaxone with sulbactam was at the top (35.10%) followed by amoxicillin plus clavulanic acid (25.33%)

Conclusion: Our study highlighted some of the common prescribing trends in the hospital. These trends were polypharmacy, higher rate of antibiotic prescribing & prescribing by brand names. The study highlighted some rational prescribing practices in the hospital like less use of injectable, cost effectiveness of drug therapy & no use of banned drugs.

Keywords: Drug utilization study, Pediatric patients, prescribing trends

INTRODUCTION

Irrational prescribing of drugs in pediatric age group is very common. In order to be rational, the drug therapy should be safe, efficacious, affordable and need based. Infancy and childhood are a period of growth and development. Due to ethical reasons children often do not participate in clinical trials [1]. Since pharmacokinetics and pharmacodynamics are different in children, which often make them more susceptible to various adverse drug reactions [2]. Similarly, the antibiotics are unnecessarily prescribed in children for viral infections, which can lead to the problem of drug resistance. In a Kentucky study, 60% of patients were prescribed antibiotics for the common cold [3]. Drug utilization studies [4] are a useful tool to facilitate rational prescribing of drugs. Various indicators were developed by International Network for the Rational Use of Drugs in collaboration with WHO, which help in the assessment of drug use practices and remedial measures [5]. The present study was designed with the aim to assess prescribing trends in the pediatric department of a tertiary care teaching hospital. The information is expected to help in interventions that would improve the prescribing pattern and rational use of drugs in children.

METHODS

The study was carried out in the pediatric outpatient Department of Career Institute of Medical Sciences, Lucknow. The study protocol was approved by Institutional Ethical Committee. The study was carried out between September 2014 and February 2015 (6 months). A prospective study was carried out on the prescriptions, selected randomly with a total of 249 prescriptions. Patient related parameters such as age, sex and body weight were recorded. The drug data such as the name of the drug, dosage forms, dosing frequency, duration, route of administration and diagnosis were recorded. The data obtained were analyzed by MS-excel software. The results were expressed as percentage or proportion.

RESULTS

The mean age of patients was 2.25 years. The neonates were 25 (9.98%). The male patients were 150 (60%) and female patients were 99 (40%). The mean body weight of patients was 11.25 kg. The distribution and proportion are shown in Table 1.

Table 1: Pediatric patient related parameters

Parameter	Number of patients	%
Age		
Neonates (up to 4 weeks)	25	9.98
Infants (4 weeks to 1-year)	120	48.12
Children (1-6 years)	75	30.66
Children (6-12 years)	29	12.50
Sex		
Male	150	60.50
Female	99	39.85
Body weight		
Up to 6 kg	90	40.07
6-12 kg	110	45.66
12-18 kg	24	08.11
18-24 kg	13	05.77

Table 2: Diagnosis pattern in different age groups

Diagnosis	N (%)				
	Neonates	Infants	Children (1-6 years)	Children (6-12 years)	Total
ARI	8 (3.60)	45 (19.51)	18 (8.23)	6 (2.22)	77 (35.999)
Enteric fever	0	0	15 (6.50)	3 (1.22)	18 (7.90)
Diarrhoea	2 (0.9)	18 (7.11)	8 (3.60)	7 (3.11)	35 (14.22)
UTI	0	4 (1.50)	6 (2.70)	0	10 (4.12)
Hepatic problems	6 (2.70)	4 (1.66)	0	0	10 (4.66)
Meningitis	0	5 (2.60)	9 (4.05)	3 (1.22)	17 (8.10)
Not diagnosed	0	0	6 (2.66)	3 (1.22)	9 (4.01)
Others	4 (2.10)	10 (4.110)	13 (4.98)	2 (1.12)	29 (12.55)
Combination	3 (1.10)	17 (7.23)	10 (4.55)	6 (2.22)	36 (15.88)

ARI: Acute respiratory infections, Others: rheumatic fever, pleural effusion, common cold, gastritis, colic, severe anemia, epilepsy, viral fever, scabies, gastritis, UTI: Urinary tract infection, Combination: Pneumonia plus vomiting, fever plus diarrhea, diarrhea plus pneumonia, malaria plus diarrhea, acute glomerulonephritis plus urinary tract infection, pneumonia plus jaundice

Table 3: Number of drugs per prescription

Drugs per patient	Number of prescriptions	%
1	12	5.98
2	44	17.23
3	51	18.11
4	67	27.44
5	45	20.50
6	16	5.11
7	14	4.98
Total	249	100
Range	1-7	
Average number of drugs	3.7	

Table 4: Number of antibiotics per prescription

Antibiotics per patient	Number of prescriptions	%	Number of antibiotics
1	35	15.11	35
2	55	22.55	110
3	70	30.66	210
4	05	3.10	20
5	02	0.80	10
Total	167	71.55	385
Range	1-5		
Average number of antibiotics	2.31		

Fig. 1: Drugs prescribed from various classes
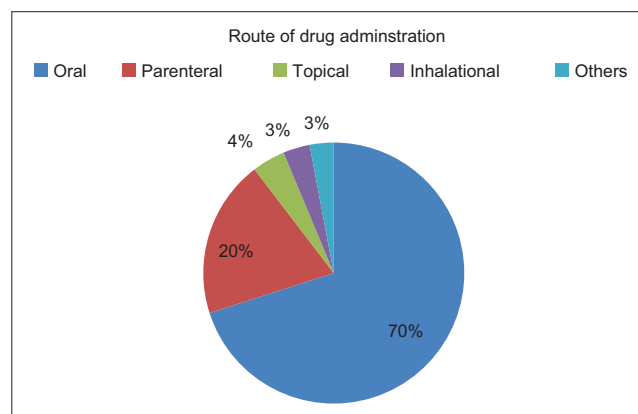
Fig. 2: Distribution of routes of drug administration
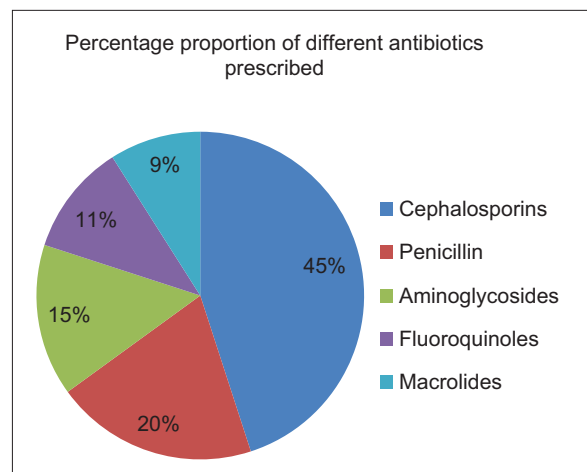
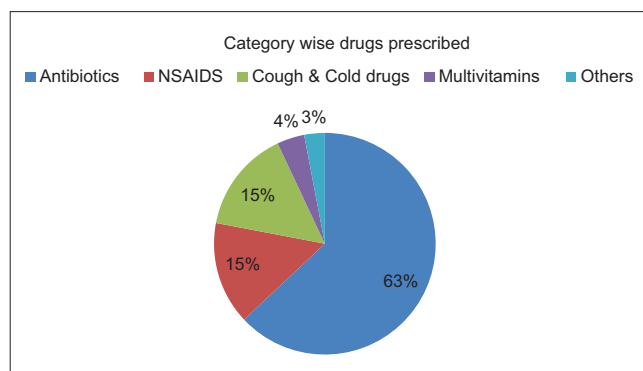**Fig. 3: Antibiotics prescribed from different groups**

As shown in table 2, majority of the pediatric patients (40.12%) were suffering from acute respiratory infections (ARIs) followed by diarrhea (18.66%). This is followed by enteric fever (7.12%) and meningitis (5.88%). Some patients were not diagnosed (2.56%), however, they were prescribed the drugs. The numbers of patients diagnosed for multisystem involvement were also significant.

A total of 922 drugs were prescribed to the total of 249 patients. 63.11% of drugs were antibiotics, whereas the non-steroidal anti-inflammatory drugs (NSAIDS) were 15.65% (Fig. 1). Cough and cold preparations were also prescribed in a significant proportion (15.23%).

Orally administered drugs contributed the highest proportion of drugs prescribed with 78.16% of total drugs (Fig. 2). Parenteral drug preparations were 14.99%. Inhalational preparations were given to patients with pneumonia by nebulization.

As high as 90.55% patients were exposed to at least two drugs. A major proportion of patients (70.11%) were prescribed at least one antibiotic.

Table 5: Frequency of individual antibiotics for specific diagnosis

Diagnosis	Cefpodox	Ceftriaxone	Cefixime	Azithro	Norflox	Genta	Cefadroxil	Amoxy	CPL	Others
ARI	25	6	30	3	0	10	0	18	2	5
Enteric fever	30	5	15	5	0	5	25	0	1	14
Meningitis	18	20	0	5	0	30	0	15	1	8
UTI	10	0	0	10	70	0	0	0	0	10
Hepatic problem	0	0	20	10	0	10	0	40	0	20
Not diagnosed	9	9	9	9	10	0	0	15	0	38
Others	5	5	25	25	5	5	5	6	1	18
Combination	10	10	15	30	05	10	5	5	1	9

ARI: ARIs, Cefpodox: Cefpodoxime, Norflox: Norfloxacine, Azithro: Azithromycin, Genta: Gentamycin, Amoxy: Amoxicillin, CPL: Chloramphenicol, Others: Rheumatic fever, pleural effusion, common cold, gastritis, colic, severe anemia, epilepsy, viral fever, scabies, Combination: Pneumonia plus vomiting, fever plus diarrhea, diarrhea plus pneumonia, malaria plus diarrhea, acute glomerulonephritis plus urinary tract infection, pneumonia plus jaundice

Table 6: Cost per day of drugs

Cost per day	Number of prescription	%
0-50	85	37.21
50-100	60	25.98
100-150	31	12.11
150-200	30	12.10
200-250	14	5.33
More than 250	03	1.11
Total	249	100

The multiple antibiotics were found in 48.66% of patients, whereas single antibiotic was prescribed in only 29.55% of prescriptions. Three antibiotics were prescribed in 22.98% of prescriptions. Multiple antibiotics were given to patients of pneumonia, urinary tract infections (UTIs) and meningitis diagnosed patients.

Cefixime was the leading antibiotic prescribed, followed by cefpodoxim. Amoxicillin plus clavulanic acid was also prescribed significantly. Among the parenteral antibiotics, ceftriaxone followed by cefotaxime was prescribed in highest number of patients. Norfloxacin was prescribed in highest percentage in UTIs whereas in meningitis, gentamycin was prescribed highest followed by cephalosporins and penicillins (Table 5).

Overall cephalosporins group of antibiotics was highest prescribed followed by fluoroquinolones (Fig. 3). Aminoglycosides, macrolides and penicillins were the other frequently prescribed antibiotics.

Combinations of antibiotics were prescribed to 65.66% of patients of which ceftriaxone plus sulbactam was at the top (35.10%) prescriptions (Table 7). Amoxycillin plus clavulanic acid was administered to 25.33% of total patients.

The prescription cost per day was quite economic. In 44.51% of total patients, the prescription cost per day was upto Rs. 50 per day (Table 6).

DISCUSSION

The male patients were more as compared to female patients. It reflects a deep rooted gender bias in the Indian society. With regard to age, maximum patients were in the age group of 1-12 months. Comparatively less cases of disease were found among the patients of age group 6-12 years. Anemia and jaundice were the prevalent diagnosis among the neonates. In most cases jaundice was physiological and self-limited. ARIs were the most prevalent diagnosis during infancy period. ARIs are classified as upper respiratory tract infections (URIs) or lower respiratory tract infections (LRIs). The upper respiratory tract consists of the airways from the nostrils to the vocal cords in the larynx, including the paranasal sinuses and the middle ear. The lower respiratory tract covers the continuation of the airways from the trachea and bronchi to the bronchioles and the alveoli. Except during the neonatal period, ARIs are the most common causes of both illness and mortality in

children under five, who average three to six episodes of ARIs annually regardless of where they live [6]. URIs are the most common infectious diseases. They include rhinitis (common cold), sinusitis, ear infections, acute pharyngitis or tonsillopharyngitis, epiglottitis, and laryngitis of which ear infections and pharyngitis causes the more severe complications (deafness and acute rheumatic fever, respectively). The vast majority of URIs have a viral etiology. Because most URIs are self-limiting, their complications are more important than the infections. Acute viral infections predispose children to bacterial infections of the sinuses and middle ear [7] and aspiration of infected secretions and cells can result in LRIs. The common LRIs in children are pneumonia and bronchiolitis. The respiratory rate is a valuable clinical sign for diagnosing acute LRI in children who are coughing and breathing rapidly. The presence of lower chest wall indrawing identifies more severe disease [8] currently; the most common causes of viral LRIs are respiratory syncytial virus. The epidemiology of influenza viruses in children in developing countries deserves urgent investigation because safe and effective vaccines are available. Before the effective use of measles vaccine, the measles virus was the most important viral cause of respiratory tract-related morbidity and mortality in children in developing countries. Diarrhea, meningitis and enteric fever were other common diagnosis among children. Majority of the drugs were prescribed orally (70%) whereas injectable route of administration was prescribed in 20% of cases. In 10% of cases drugs were prescribed by inhalational route. In nearly 35% of patients, three drugs were prescribed which was less than in the study was carried out by Ashraf *et al*. At least an antibiotic was prescribed in 68.98% of patients which was less than the study done by Ashraf *et al*. 2-3 antibiotics were prescribed to 39% of patients. Antibiotics were prescribed without investigation on empirical basis with an average of 2.11 per prescription. At least an NSAID was prescribed in 15% of patients. Paracetamol was the most common NSAID followed by ibuprofen. At least one antihistaminic was prescribed in 15% of patients. Chlopheniramine was the most commonly prescribed antihistaminic. Among the antibiotics, cephalosporins were the most frequently prescribed antibiotic. Gentamycin was the most common antibiotic prescribed with cefixime and cefpodoxim in enteric fever. In patients of meningitis, gentamycin was used with amoxicillin and clavulanic acid. Ceftriaxone with sulbactam and vancomycin were commonly administered in cases of pneumonia. Costs of prescriptions were quite economic (0-50 Rs. per day), indicating the rational use of drugs.

CONCLUSION

Our study highlighted some of the common prescribing trends in the hospital. These trends were polypharmacy, higher rate of antibiotic prescribing and prescribing by brand names. Our study had some limitations. The study was carried out over a period of 6 months. Seasonal variations in disease pattern and drug utilization were not considered. The numbers of patients were low in study and included only outdoor patients. The study was restricted to only one hospital. The study highlighted some rational prescribing practices in the hospital like less use of injectable, cost effectiveness of drug therapy and no use of banned drugs.

Table 7: Antibiotic combinations prescribed

Combination	Antibiotic class	Number of prescriptions	%
Ceftriaxone+sulbactam	Cephalosporin+beta lactmase inhibitor	30	35.66
Amoxycillin+clavulanic acid	Penicillin plus beta lactamase inhibitor	20	25.11
Cefpodoxime+amikacin	Cephalosporin plus aminoglycoside	08	8.99
Ceftriaxone+vancomycin	Cephalosporin plus macrolide	11	14.21
Others		09	13.66
Total		69	100

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